

WHAT IS CLAIMED IS:

1. A method of fabricating a semiconductor device comprising steps of:

5 forming a first trench on an element isolation region of a semiconductor substrate;

 forming a first film consisting of an insulator film to fill up said first trench;

10 forming a second trench larger in depth than said first trench in said first trench;

 forming an embedded film in said second trench; and

 substantially simultaneously polishing an excess depositional portion of said first film and an excess depositional portion of said embedded film.

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2. The method of fabricating a semiconductor device according to claim 1, further comprising a step of forming a second film superior in coverage to said first film on said first film,

20 said step of forming said second trench including a step of etching said semiconductor substrate through said second film and said first film serving as masks thereby forming said second trench larger in depth than said first trench in said first trench.

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3. The method of fabricating a semiconductor device according to claim 2, wherein
said second film is an HTO film.

5 4. The method of fabricating a semiconductor device according to claim 2, wherein

said step of forming said second trench includes steps of:

forming a resist film on a prescribed region of said
10 second film and thereafter patterning said second film and said first film through said resist film serving as a mask, and

removing said resist film and thereafter etching said semiconductor substrate through patterned said second film
15 and patterned said first film serving as masks thereby forming said second trench larger in depth than said first trench in said first trench.

20 5. The method of fabricating a semiconductor device according to claim 4, wherein

said step of forming said second trench includes a step of etching said semiconductor substrate while leaving said second film by a prescribed thickness thereby forming said second trench larger in depth than said first trench
25 in said first trench.

6. The method of fabricating a semiconductor device according to claim 5, wherein

5 said second film has a thickness of at least 300 nm and not more than 500 nm.

7. The method of fabricating a semiconductor device according to claim 2, wherein

10 said step of forming said second trench includes steps of:

forming a resist film on a prescribed region of said second film and thereafter patterning said second film and said first film through said resist film serving as a mask, and

15 etching said semiconductor substrate through said resist film, patterned said second film and patterned said first film serving as masks thereby forming said second trench larger in depth than said first trench in said first trench.

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8. The method of fabricating a semiconductor device according to claim 2, wherein

said first film is superior in embedding property to said second film.

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9. The method of fabricating a semiconductor device according to claim 1, wherein

said step of forming said first film includes a step of forming said first film consisting of an insulator film
5 by high density plasma CVD.

10. The method of fabricating a semiconductor device according to claim 2, wherein

said step of forming said second film includes a step
10 of forming said second film superior in coverage to said first film by a method other than high density plasma CVD.

11. The method of fabricating a semiconductor device according to claim 10, wherein

15 said step of forming said second film includes a step of forming an HTO film by low pressure CVD.

12. The method of fabricating a semiconductor device according to claim 1, further comprising a step of forming
20 a first insulator film on the inner surface of said second trench in advance of said step of forming said embedded film in said second trench.

13. The method of fabricating a semiconductor device
25 according to claim 12, wherein

said step of forming said embedded film in said second trench includes a step of forming a semiconductor film in said second trench formed with said first insulator film.

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14. The method of fabricating a semiconductor device according to claim 12, wherein

said step of forming said first insulator film includes a step of forming said first insulator film by CVD.

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15. The method of fabricating a semiconductor device according to claim 1, further comprising a step of forming a second insulator film covering said element isolation region after said step of substantially simultaneously polishing said excess depositional portion of said first film and said excess depositional portion of said embedded film.

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16. The method of fabricating a semiconductor device according to claim 1, further comprising a step of forming a semiconductor element on an element forming region enclosed with said element isolation region.